JOURNAL
OF THE
WASHINGTON ACADEMY OF SCIENCES
VOL. III, MARCH 19, 1913 No. 6

MINERALOGY.—*Calcium vanadates from Peru, Colorado and Utah.* W. F. HILLEBRAND, Bureau of Standards, FRED. E. WRIGHT and H. E. MERWIN, Geophysical Laboratory.

Among the vanadium minerals brought to this country from Minasragra, Peru, a number of years ago by Mr. Foster Hewett and briefly described by him were two, the one red the other orange, which analyses made by one of us (H) at the time showed to be hydrous calcium vanadates, probably hexavanadates.

Later, the senior author (H) received at different times from Messrs. T. F. V. Curran, A. G. McNaughton and R. H. McMillen, a red vanadium mineral from western Colorado, found in the Joe Dandy claim of the General Vanadium Company of America, Paradox Valley, Montrose County, about 12 miles from Naturita. This mineral, impregnating and filling cavities in a friable sandstone, closely resembles one of those from Peru.

Still more recently, samples of similar minerals from an unknown location in Paradox Valley and from Thompsons, in eastern Utah, were shown us by Mr. Frank L. Hess of the U. S. Geological Survey. Optical evidence proves that the one from Paradox Valley is the same as the red vanadate from Peru. The other, from Thompsons, Utah, as also the mineral from the Joe Dandy claim, differs in habit and also optically in some respects from the Peruvian mineral, tho chemically there is qualitative if not quantitative similarity.

The object of this note is to secure our right to study further and to name these minerals. An important feature of work still

to be done is the determination of the condition of the water—a tedious task—and the quantitative analysis of the mineral from Utah, hence it may be some time before we shall feel warranted in presenting our completed work. It will be better to describe all the minerals in one comprehensive paper, than to publish now incomplete details to be supplemented later.

Besides the red calcium vanadates we received from Messrs. McNaughton and McMillen a black friable sandstone, also from the Joe Dandy claim. It is not carbonaceous as one might suspect, but the black color is due to a vanadium mineral occurring in indistinct prisms (whether this is a calcium compound or not is as yet undetermined). It is somewhat doubtful if chemical study will reveal its exact composition, for other vanadium compounds are present with the black one, as is indicated by the existence of vanadium in three states of oxidation, corresponding to V_2O_5, V_2O_4 and V_2O_3. The greater part of the vanadium is in the V_2O_4 state, and to this the color of the rock seems to be due. In the course of time the specimens have taken on a greenish cast, but on freshly broken surfaces the color is still black.

It is much to be desired, both from scientific and commercial standpoints, that a careful geological exploration of the uranium-vanadium bearing areas of western Colorado and Eastern Utah be undertaken at an early date. These areas are being continually extended as new discoveries are made.

BOTANY.—*A new generic name for the sapote.* O. F. Cook, Bureau of Plant Industry.

Much confusion has attended the application of generic names to two important tropical fruit trees, the sapote and the sapodilla, the latter being the source of the chicle gum of commerce. Additional facts that tend to simplify these nomenclatorial complications have come to light during a recent review of the subject. The final result is to show that the generic name Achras belongs definitely to the sapodilla tree, and that a new generic name is required for the sapote. The reasons of these conclusions may be summarized as follows:

The Linnaean name Achras is a direct substitute for Plumier's genus Sapota. It was based by Linnaeus in his *Genera Plantarum* on Plumier's figures of an oval-fruited form of the sapodilla. The first binomial use of Achras in the first edition of the *Species Plantarum* is also typified by a reference to Plumier, so that there is no alternative to *Achras zapota* Linnaeus as the name of the sapodilla. In the second edition of the *Species Plantarum* Linnaeus made the mistake of supposing that Plumier's oval fruit was a sapote, and the erroneous synonomy of this work has misled many later authors.

The retention of Plumier's name Sapota in Miller's *Gardener's Dictionary* (7 Ed., 1759) does not justify a revival of this name, since Miller followed Plumier in basing the genus on the sapodilla, tho the sapote was included as a second species. Some writers might consider this a reason for transferring the name to the sapote, but if such changes in the applications of pre-Linnaean names are to be permitted no advantage of stability is gained by accepting the substitutions made by Linnaeus. Tho such cases have not been the subject of direct nomenclatorial legislation, they are covered by implication under the rule that the substitution of a new generic name does not change the type of a genus. This seems to preclude the idea that the type can be changed informally, merely by referring other species to the genus. In other words, the use of a generic name for species that are not congeneric with the original type should not be allowed to change the application of the name. This is also partially recognized under another rule that provides for the selection of types of genera adopted from nonbinomial literature from those of the original species that receive names in the first binomial publication. The effect of this provision is to allow Linnaeus to change the applications of names as well as to substitute new names, so that all of the genera of Linnaeus' *Genera Plantarum* can be typified from the species placed under them in the *Species Plantarum*. But to extend this freedom to other authors who reverted, often quite casually, to the pre-Linnaean generic names, is to lose the practical advantages of the method of types. The recognition of a pre-Linnaean genus by a post-Linnaean author, tho it may

be supposed to revive the name under the binomial system, should not affect the application of the name.

The earliest binomial name applied to the sapote seems to have been Jacquin's *Sideroxylum sapota*.[1] The descriptive phrase accompanying this name refers to the compound calyx or involucre which is a peculiarity of the sapote, and there is also a citation of Sloane's plate of "The Mammee Sapota tree" of Jamaica. Jacquin's species was adopted by Linnaeus in the second edition of the *Species Plantarum*, but Jacquin's specific name would have become a homonym if transferred to the genus Achras and was replaced by *Achras mammosa* Linnaeus.[2]

Neither Sideroxylum nor Lucuma is available as a generic name for the sapote, both being based on species that are no longer treated as congeneric with this tree. The name Vitellaria, borrowed from Gaertner and applied to the sapote by Radlkofer, has been rejected by later writers and remains a hyponym, not having been associated with an identifiable generic type. Two other generic names, Calospermum and Calocarpum, proposed for the sapote by Pierre, prove to be homonyms.

A new generic name *Achradelpha* is accordingly proposed, with *Achradelpha mammosa* (Linnaeus) as the type species.

A more extended statement of the case, with discussions of some of the nomenclatorial principles involved, has been offered for publication in Contributions from the U. S. National Herbarium.

BACTERIOLOGY.—*The destruction of bacteria in milk by ultraviolet rays.*[3] S. HENRY AYERS, and W. T. JOHNSON, JR. Dairy Division, Bureau of Animal Industry. Communicated by Karl F. Kellerman.

During the past few years much attention has been given to the bactericidal action of ultraviolet rays. Numerous investigators have found that the ultraviolet rays of short wave length,

[1] Enumeratio pl. Ins. Carib. 1760.

[2] Species Plantarum, 2 ed. 1: 469. 1762.

[3] The complete data obtained in this work will be published as a bulletin of the Bureau of Animal Industry.

from 3000 to 2000 Angstrom units possessed a powerful bactericidal power and have endeavored to make a practical use of this fact. Water when clear has been successfully treated by the ultraviolet rays but when applied to milk the attempts to obtain a sterile product have not been so successful.

The object of the present work has been to determine if it is possible to sterilize milk by the ultraviolet rays and also how practicable the process would be.

In these experiments milk was exposed over two drums revolving in troughs in such a manner that milk was picked up from a trough in a thin layer by one drum, then taken off by a scraper and conveyed to a second tank where it was picked up by the second drum. After going over the second drum, the milk was collected by a second scraper which conveyed it to a sterile flask.

This apparatus enabled us to obtain layers of milk of different thicknesses by rotating the drums at various rates of speed which also, of course, varied the length of exposure.

The ultraviolet rays were generated by a quartz mercury vapor lamp operating on a 220 volt direct current circuit taking 3.5 amperes. The light tube of the lamp was at a distance of four inches above the surface of the drums. In general, it may be said, that the thickness of the layer of milk exposed averaged about 0.1 mm. The length of exposure over the two drums was about two seconds, when the drums were making 20 to 24 R.P.M. and about one second at 50 to 56 R.P.M.

CONTROL MILK	EXPOSED MILK	
	Drums making 20-24 R.P.M.	Drums making 50-56 R.P.M.
Bacteria per cc.	*Bacteria per cc.*	*Bacteria per cc.*
20,000	5	1,300
26,400	370	11,200
12,400,000	9,900	1,130,000
15,200,000	11,000	614,000
6,800	490	2,290
10,200,000	38,000	795,000
79,000	1,070	24,000
1,120,000	2,090	
1,660,000	3,700	

When milk was exposed in this apparatus, very satisfactory bacterial reductions were obtained as shown in the above table.

Thruout the experiments the temperature of the milk during exposure never was over 30°C. (86°F). Consequently high temperature played no part in the destruction of the bacteria.

Numerous experiments were performed to determine the action of the rays on vegetative cells and spores and to study numerous conditions which affect the power of the rays. A few experiments were also made to determine the possibility of sterilizing milk bottles by the rays. The results can be best presented in the form of a summary as follows:

1. When milk was exposed in thin layers to ultraviolet rays there was a marked reduction in the bacterial content.

2. The action of the rays was entirely independent of the action of heat since the temperature of the exposed milk was never over 30°C. (86°F.)

3. The most satisfactory method of exposure was over two revolving drums the tops of which were at a distance of 4 inches below the light tube of the lamp.

4. The two factors of greatest importance in the successful application of the rays were the thickness of the layer and the length of exposure. A thin layer allows a more complete penetration of the rays and the longer the exposure the more chance they have to act.

5. Ultraviolet rays exerted a greater bactericidal action on vegetative cells in milk than on spores when exposed under the same conditions.

6. No greater action of the rays on bacteria was observed when the bacteria were weakened by pasteurization immediately preceding the exposure.

7. From the study of two samples of milk exposed to ultraviolet rays it was apparent that the rays did not exert any specific bactericidal power on any particular group of bacteria in the milk. As stated before, however, there was a difference in the action of the rays on bacteria in the vegetative and spore state.

8. Under similar conditions of exposure there seemed to be somewhat less bacterial reduction in a 15 per cent cream than in

milk. This was probably due to the fact that the cream when picked up by the revolving drums was in a thicker layer than was the milk.

9. When milk was exposed under conditions suitable for a satisfactory reduction of the bacteria by the ultraviolet rays there was also produced an abnormal, disagreeable flavor. This flavor would render the milk unsaleable.

10. A large percentage of the bacteria in normally dirty and artificially infected milk bottles were destroyed by exposure to the rays. The best results were obtained when the bottles were exposed directly under the lamp, the top of the bottle being about 4 inches from the lamp tube. When bottles were exposed on one side of the lamp and not directly under it, poor results were obtained. It was not possible to completely sterilize the bottles even after a ten minutes' exposure.

CONCLUSIONS

The experiments indicate that with quartz mercury vapor lamps of the present power and construction it would not be possible to completely sterilize milk by the ultraviolet rays.

It might be possible to obtain bacterial reductions as great as by pasteurization, even on a commercial scale, by the use of large, revolving drums and a number of lamps. However, in milk so treated there would be no assurance of the complete destruction of pathogenic organisms since the rays do not seem to exert any selective destructive action on vegetative cells. Of course, since pathogenic organisms might be assumed to be present in a small number in proportion to the total bacteria in milk, if 99.9 per cent of the organisms present were destroyed, it might be assumed that that the pathogenic bacteria would be destroyed. This process, however, would not afford the same security as does proper pasteurization. Then, again, it would be difficult on a commercial scale to control constantly the factors which influence the bactericidal action of the rays. Aside from these points the disagreeable flavor imparted to the milk by exposure to the rays renders the process impracticable on a commercial scale.

It is also doubtful if the lamps could be made to compete successfully with the present method of steaming milk bottles in order to partially sterilize them.

In conclusion, it must be stated that we have not intended to make this work an exhaustive study of the application of the bactericidal power of the ultraviolet rays. It is therefore possible that better results may be obtained in the future by use of more powerful lamps and different methods of exposing the milk.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. Each of the scientific bureaus in Washington has a representative authorized to forward such material to this journal and abstracts of official publications should be transmitted through the representative of the bureau in which they originate. The abstracts should conform in length and general style to those appearing in this issue.

OCEANOGRAPHY.—*A study of the salinity of the surface water in the North Pacific Ocean and in the adjacent enclosed Seas.* AUSTIN HOBART CLARK. Smithsonian Miscellaneous Collections, **60**: No. 13, 1–13. 1912.

The complete salinity records of the *Albatross* cruise of 1906, corrected, are here given. The original observations were made by the author. A short preliminary account of the seasonal variation in salinity on the California coast, and of the conditions in the Bering Sea, as worked out from the *Albatross* records, is included.

In addition there is a short sketch of the surface variations in salinity and of the surface currents, mostly taken from the works of Vice-Admiral Makaroff. A. H. C.

PHYSICAL CHEMISTRY.—*On the effect of high pressures on the physical and chemical behavior of solid substances.* JOHN JOHNSTON and L. H. ADAMS, of the Geophysical Laboratory. American Journal of Science (4), **35**: 205–254. 1913.

This paper is an endeavor to review and to define the present status of our knowledge of the effect of high pressures on the behavior of solids, to reconcile some of the conflicting statements on the subject to be found in the literature, and to indicate the conclusions which may justifiably be drawn from the available evidence, especially with regard to their application to the discussion of geological phenomena. Some of this confusion results from the employment of indefensible criteria in ascertaining the character and magnitude of the change produced by pressure, as, for example, in determining the effect of pressure in promoting chemical reaction between solids, but in the main it is due to failure to take into account the fact that the effects produced depend upon the character, or mode of action, of the compression. The effects are different,

according as we are dealing with pressure uniform in all directions (true hydrostatic pressure) or with a mode of compression which does not satisfy this condition, in other words, the effects vary—as indeed is almost obvious—according as the solid retains its original form or undergoes deformation.

Uniform pressure has a comparatively slight effect on the melting point, it usually raises it, and by an amount, which in the systems hitherto investigated, is seldom greater than 10°, and never greater than 30°, per 1000 atmospheres. Its effect on solubility is slight, and for practical purposes negligible as compared with the influence of temperature upon solubility. Uniform pressure tends to further those reactions which are accompanied by a decrease of volume; but it by no means follows that it will cause these (or other) reactions to occur, for whether a reaction takes place or not is determined by its velocity under the particular conditions, and such evidence as there is tends to show that reaction velocity is not much affected by uniform pressure.

The effects of *non-uniform* pressure greatly outweigh those of uniform pressure. It *always* lowers the melting-point and raises the solubility, and by amounts which are many times greater than the corresponding changes with uniform pressure. If we make the plausible assumption that permanent deformation of a crystalline aggregate is conditioned by a real local melting (of those parts, which at any moment bear the brunt of the load), we find the amount of pressure required to cause melting at ordinary temperature to be within the bounds of probability. Such we believe to be the efficient cause in producing most of the phenomena recorded as occurring when solid systems were submitted to compression. This view, while it coordinates satisfactorily the whole of the experimental work hitherto done, conflicts with none of the available direct evidence.

It follows therefore that we can determine the effect of pressure on a solid system only if we can define the character of the compression (with reference to its approach to uniformity or otherwise) as well as its magnitude, and even then, only when the requisite thermal and other data, characteristic of the system, are available. J. J. and L. H. A.

ENGINEERING.—*The testing and properties of textile materials.* Bueau of Standards Circular 41, 1913.

The scope of textile testing which the Bureau of Standards is now prepared to undertake is summarized below.

1. Determinations upon raw and unspun fibers: (a) identity of fiber,

(b) approximate length; (c) moisture content and "regain"; (d) quantity of oil, grease and foreign substances contained; (e) percentage loss in scouring raw wool.

2. Determinations upon yarn, thread and twine: (a) length; (b) tensile strength and elasticity; (c) count or number; (d) twist; (e) percentage of loading, sizing and coloring material; (f) percentage fiber composition.

3. Determinations upon fabric: (a) weight; (b) tensile strength and elongation; (c) percentage fiber composition; (d) thread count; (e) yarn number of size; (f) folding endurance, (g) action of light on colors.

W. S. LEWIS.

ENGINEERING.—*Physical testing of cotton yarns.* W. S. LEWIS. Technological paper No. 19, Bureau of Standards. (In press.)

The investigation consisted in a study of single and two ply yarns as to variations in size, twist and tensile strength of yarns within cops, bobbins, skeins, etc., and also their behavior under various relative atmospheric humidities. W.S.L.

GEOGRAPHY.—*A study of biological paleogeography in its bearing on the origin of man in America.* AUSTIN H. CLARK. Science (N.S.), **35**: 669–670. 1912.

A short sketch of the ancient land connections between the Americas and other land masses, with the conclusion that man probably entered America over a broad land area connecting Alaska with northeastern Asia. A. H. C.

PALÆONTOLOGY.—*Restoration of the genus Eldonia, a genus of free swimming Holothurians from the Middle Cambrian.* AUSTIN H. CLARK. Zoologischer Anzeiger, **39**: Nr 25/26: S. 723–725. 1912.

A figure of a restoration of the curious holothurian described by Walcott as *Eldonia ludwigi* is given, together with a description of the animal. The figure is a composite from all the figures published in the original paper. A. H. C.

BOTANY.—*A synopsis of the red firs.* WILLIAM H. LAMB. Proceedings of the Society of American Foresters, **7**: No. 2. 1912.

This is a discussion of the distinguishing characteristics of noble fir (*Abies nobilis* Lindl.), red fir (*Abies magnifica* Murr.), and Shasta fir (*Abies shastensis* Lem.). Much confusion exists as to the distribution

of these species in California and Oregon and especially in the region of the Klamath National Forest, where noble fir of the north is associated with red fir and Shasta fir of the south. To facilitate correct reports of the occurrence of the red firs, the conspicuous characters by which they may be most conveniently recognized are set forth with keys, photographs of typical cones, and drawings of leaf sections and of cone scales with bracts. W. H. L.

ZOOLOGY.—*Descriptions of eleven new crinoids belonging to the families Calometridae and Thalassometridae discovered by the* Siboga *in the Dutch East Indies.* AUSTIN H. CLARK. Zoologischer Anzeiger, **39**: Nr. 11/12: S. 420–428. 1912.

Short preliminary diagnoses are here given of new species in these two families found by the *Siboga*. A. H. C.

ZOOLOGY.—*Seventeen new East Indian crinoids belonging to the families Comasteridae and Zygometridae.* AUSTIN H. CLARK. Proceedings of the Biological Society of Washington, **25**: 17–28. 1912.

Short preliminary diagnoses are herein given of seventeen new species of Comasteridae and Zygometridae discovered by the *Soboga* in the Dutch East Indies. A. H. C.

ZOOLOGY.—*Naumachocrinus, a new genus belonging to the crinoid family Phrynocrinidae.* AUSTIN H. CLARK. Proceedings of the U. S. National Museum, **42**: 195–197. 1912.

The genus Naumachocrinus, herein described, is closely related to the genus Phrynocrinus, heretofore the only known genus of the family Phrynocrinidae.

Naumachocrinus is from the Hawaiian Islands, and is the first stalked crinoid to be reported from that region, Phrynocrinus is from southern Japan, where it was discovered by the author in 1906. A. H. C.

ZOOLOGY.—*Six new East Indian crinoids belonging to the family Charitometridae.* AUSTIN H. CLARK. Proceedings of the Biological Society of Washington, **25**: 77–84. 1912.

Short preliminary diagnoses are herein given of six new species of Charitometridae discovered by the *Siboga* in the Dutch East Indies. A. H. C.

ZOOLOGY.—*Notes sur les crinoïdes actuels du muséum d'histoire naturelle de Paris.* AUSTIN H. CLARK. Bulletin du Muséum d'Histoire Naturelle de Paris, No. 4, 1911: 243–260. 1911.

A complete list of the crinoids in the collection of the Paris museum, with redescriptions of the types of Lamarck and of Müller, detailed descriptions of the more interesting specimens other than types, and a detailed historical introduction.

The work upon these specimens was done in Paris. A. H. C.

ZOOLOGY.—*Die Fauna Südwest-Australiens: Crinoidea.* AUSTIN HOBART CLARK. Ergebnisse der Hamburger südwest-australischen Forschungsreise 1905, Bd. 3, Lief. 13, S. 435–467. 1911.

This paper is based upon the collection of Western Australian crinoids, principally from Shark Bay, made by Drs. Michaelsen and Hartmeyer while on the Hamburg West Australian Expedition. It is a monographic account of the crinoids of the western portion of Australia, including an historical introduction and a detailed discussion of the distribution. A. H. C.

ZOOLOGY.—*The recent crinoids of Australia.* AUSTIN HOBART CLARK. Memoir IV, Australian Museum, Sydney, New South Wales. Scientific results of the trawling expedition of H.M.C.S. *Thetis* off the coast of New South Wales, in February and March, 1898. Part 15, pp. 705–804. 1911.

This is a monographic account of the recent crinoids of Australia, based primarily upon the collections in the Australian museum at Sydney. It is prefaced by an historical introduction, and concluded by a complete bibliography. In its preparation the author visited all of the museums of Europe in which Australian crinoids are known to be preserved, and examined all the types of Australian species.

A. H. C.

ZOOLOGY.—*The crinoids of the Indian Ocean.* AUSTIN HOBART CLARK, B.A., F.R.G.S. Echinoderma of the Indian Museum, Part VII, Crinoidea, pp. i-iii, 1–325, 61 figures in the text, 4to. 1912.

A monographic account of the crinoids of India and the East Indies. In the introduction is given an historical sketch of the development of the study of the Indian crinoids, with a discussion of their distribution, ecology, etc., a complete bibliography is appended.

The synonymy and habitat of over 400 species are included, many of which are new. A. H. C.

ZOOLOGY.—*A revision of the American species of Peripatus.* AUSTIN HOBART CLARK. Proceedings of the Biological Society of Washington, **26**: 15–20. 1913.

The American species belonging to the family Peripatidae are distributed in the following genera: *Oroperipatus* Cockerell, *Peripatus* Guilding (with the subgenera *Plicatoperipatus*, nov., *Macroperipatus*, nov., *Peripatus, sensu stricto*, and *Epiperipatus*, nov.).

The American species belonging to the Peripatopsidae is considered as representing a distinct genus, which is recognized under the name of *Metaperipatus*, nov.

The family Peripatidae is divided into two subfamilies, Peripatinae, including *Mesoperipatus* (a central African type), *Oroperipatus* and *Peripatus* (with the included subgenera), and Eoperipatinae, nov., including the East Indian genus *Eoperipatus*. A. H. C.

ZOOLOGY.—*Notes on American species of Peripatus, with a list of known forms.* AUSTIN HOBART CLARK. Smithsonian Miscellaneous Collections, **60**: No. 17, 1–5. 1913.

Peripatus (*Peripatus*) *juanensis* Bouvier is recorded from the island of Vieques near Porto Rico, and *Peripatus* (*Macroperipatus*) *geayi* Bouvier is recorded from La Chorrera, Panama. In an appendix is given a list of all the American species of the group, with the ascertained range of each. A. H. C.

ZOOLOGY.—*On a small collection of recent crinoids from the Indian Ocean.* AUSTIN H. CLARK. Records of the Indian Museum, **7**: Part 3, No. 26, 267–271. 1912.

The collection herein described was received too late to be included in the monograph of the crinoids of India by the same author, and so an account of it was published as a supplementary paper. A. H. C.

ZOOLOGY.—*Preliminary descriptions of eleven new crinoids belonging to the families Himerometridae, Mariametridae and Colobometridae, discovered by the* Siboga *in the Dutch East Indies.* AUSTIN H. CLARK. Annals and Magazine of Natural History, (8) **10**: 31–41. 1912.

Short preliminary diagnoses are here given of new species in these three families found by the *Siboga*. A. H. C.

ZOOLOGY.—*Das relative Alter der rezenter Seelilienfaunen.* A. H. CLARK. Naturwissenschaftliche Rundschau, J. G. 27, Nr. 15, S. 191–192. 1912.

An attempt is herein made to ascertain the comparative age of two faunas by internal characters. A. H. C.

ZOOLOGY.—*The crinoids of the Solomon Islands.* A. H. CLARK. Records of the Australian Museum, **9**: 81–86. 1912.

A monographic account, with a bibliography, of the crinoids known from the Solomon Islands, based upon a collection from Ugi belonging to the Australian Museum of Sydney, New South Wales. A. H. C.

ZOOLOGY.—*The crinoids of the Natural History Museum at Hamburg.* AUSTIN H. CLARK. Smithsonian Miscellaneous Collection, **60**: No. 10, 1–33. 1912.

A complete list of the crinoids in the collection of the Naturhistorisches Museum at Hamburg, with redescriptions of types, detailed descriptions of the more interesting specimens other than types, an historical account of the collection, and a bibliography of the works based wholly or in part upon it.

Part of the collection was sent to Washington for study and comparison with material in the U. S. National Museum, but the greater portion was examined in Hamburg. A. H. C.

ZOOLOGY.—*The crinoids of the museum für Naturkunde, Berlin.* AUSTIN HOBART CLARK. Proceedings of the U. S. National Museum, **43**: 381–410. 1912.

A complete list of the crinoids in the collection of the Museum für Naturkunde, with detailed descriptions of the more interesting specimens with an historical account of the collection and a bibliography of the works based wholly or in part upon it.

There are also given lists of the type specimens, with the references to the original descriptions, of the species other than types mentioned in the literature, with the references, and of the specimens donated by this museum to the U. S. National Museum.

Most of the collection was sent to Washington for study, but the author examined the small remaining portion in Berlin. A. H. C.

ICHTHYOLOGY.—*Alaska fisheries and fur industries in 1911.* BARTON W. EVERMANN. Bureau of Fisheries Document No. 766, pp. 100. Issued December 16, 1912.

The Alaska Fisheries Service, which for the past two years has included administration of the Alaska fur resources also, is reported upon for the calendar year 1911 under the four departments of general administration, statistics, fish culture, and fur-seal service. The salmon fishery grounds, packing establishments and hatcheries were inspected as usual, and violations of law were duly reported and dealt with. The fisheries as a whole were found to have yielded 177,572,873 pounds of products, worth $16,863,728. The furs of all kinds shipped out of the territory had a value of $802,750, of which $432,231 was the value of sealskins.

From the standpoint of science the most important work was the continuation of observations in Nushagak Bay and Wood River, where the salmon runs are being counted yearly for the purpose of developing, thru the knowledge thus obtained, a satisfactory code of fishery regulations. The red salmon run was found to have decreased 30 per cent in the three years since 1908, but interpretation of this decrease depends, of course, upon the solution of now undetermined questions in the life history of the salmon. Among the most practical questions still unanswered are:

1. Do all species of salmon regularly return to the home stream, i.e., the waters where hatched, or are they diverted at any time by adverse winds, food conditions, etc.?

2. May the run in a stream be built up by closing the stream to fishing, and if so to what extent?

3. What is the normal age of each species and what period is spent in fresh water?

4. What percentage of fry under normal conditions is produced from eggs deposited naturally?

5. Are any disadvantages suffered by fish artificially hatched?

Somewhat inconclusive evidence confirming the parent-stream theory has resulted from experiments in marking young salmon, and indications are negative as to the utility of closing streams to fishing. The third of the above questions alone seems to be approaching solution, by means of examination of scales of the fish. A rather hasty examination of scales of a small number of Nushagak salmon in 1911 leads to the conclusion that the greater number of adults return at five years of age instead of four as has been believed on the basis of the Fraser River runs.

ETHEL M. SMITH.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

The 263rd meeting was held in the Cosmos Club, January 8, 1913, and the formal communications were presented:

The bearing of Pre-Cambrian structure on the origin of the Homestake ore body: SIDNEY PAIGE. It is suggested that the main Homestake ore body owes its origin to the presence of a strong fault and the subsequent mineralization of a calcareous series. Geologic work has proved the existence of the calcareous series on the surface and in the mine and structural considerations demand the fault. The form of the ore body is that which would be taken if a folded sedimentary series were cut by a fault and replaced by solutions rising along the fault. The particular form which observed facts would require of such a calcareous series as is present agrees with the form of the ore body as determined by mining. Microscopic examination of ores and wall rocks, as far as carried on, support this hypothesis.

A recent discovery of dinosaurs in the Tertiary: W. T. LEE. Ceratopsian bones were found during the summer of 1912, nine miles east of Colorado Springs, Colorado, in sec. 3, T. 14 S., R. 65 W., about 500 feet above the base of the Dawson arkose (the lower part of the Monument Creek formation of former writers). Dinosaurs were found at a locality that had previously yielded a bone of a Tertiary mammal and a number of Eocene plants which, according to Knowlton, belong in the Denver flora. On the evidence of the plant remains the beds containing the dinosaur bones are correlated with the oldest Tertiary (Raton formation) of the Raton Mesa region in southern Colorado and northern New Mexico, and with the Wilcox-Eocene formation of the Gulf region.

It has long been known that the beds now called Dawson arkose lie with conspicuous unconformity on older rocks that range in age from Laramie to pre-Cambrian, and this unconformity, together with the presence in the beds above it of a Tertiary mammal and of Eocene plants, is thought sufficient to establish the Tertiary age of the Dawson arkose; and inasmuch as the Ceratopsian bones were found in the same beds it is concluded that some of the dinosaurs existed in early Tertiary time.

A paleobotanical study of the coal-bearing rocks of the Raton Mesa region of Colorado and New Mexico: F. H. KNOWLTON. The coal-bearing section in the Raton Mesa region was first (1867–1878) considered by Lesquereux, on paleobotanical evidence, as referable to the Tertiary and similar in position to the Lignitic, or Eolignitic, of Mississippi, but later

(about 1883 to 1907) it came, without additional study of the plants, to be regarded as Laramie on the basis of its supposed similarity to the Laramie of the Denver Basin. The renewal of interest in the region began in 1907, at which time W. T. Lee detected the presence of a wide-spread unconformity in the midst of this supposedly continuous Cretaceous section. To the coal-bearing beds below the unconformity the name Vermejo formation has been given, while those above are known as the Raton formation. The present paleobotanical study was undertaken to give such answers as it might as to (1) the distinctness of these formations and (2) as to their age. The results of this study are satisfactory and seemingly conclusive.

The fossil flora of the Raton Mesa region comprises 257 forms of which number 106 are found in the Vermejo formation and 151 in the Raton formation. As only 4 species have been found to cross the line of the unconformity we have the answer to the first question, namely as to the distinctness of the two formations.

The Vermejo flora is shown to have no appreciable relation with the Laramie of the Denver Basin, since there is but one species in common. Its close affinity (identity of over 90 per cent of the species having an outside distribution) is with the Mesaverde, and the conclusion is reached that Vermejo formation is Montana in age and in the approximate position of the Mesaverde.

The Raton flora has 5 species in common with the Laramie of the Denver Basin, 4 with the Arapahoe formation, between 30 and 40 with the Denver, and over 30 with the Wilcox formation. As the Wilcox has intercalated layers of marine Eocene invertebrates, and itself rests on the marine Eocene Midway formation, the conclusion is reached that the Raton formation is in approximately the same stratigraphic position, and is also Eocene in age. As the Denver formation occupies approximately the same position as the Raton formation, it may be taken as additional proof that the Denver is likewise of Eocene age. This latter result, however, is merely a confirmation of the original contention of Cross, who named and described the Denver formation.

The broader application of these results to the stratigraphic position of the ceratopsian dinosaurs elsewhere is obvious.

FRANK L. HESS, *Secretary.*

THE BIOLOGICAL SOCIETY OF WASHINGTON

The 36rd annual meeting was held in the hall of the Cosmos Club, December 14, 1912, with Vice-President W. P. Hay in the chair. Reports of officers for the year 1912 were received and the annual election of officers took place. The election resulted as follows: *President*, E. W. NELSON; *Vice-Presidents*, J. N. ROSE, PAUL BARTSCH, W. P. HAY, A. D. HOPKINS; *Recording Secretary*, D. E. LANTZ; *Corresponding Secretary*, N. HOLLISTER; *Members of Council*, HUGH M. SMITH, VERNON BAILEY, WM. PALMER, A. B. BAKER, and A. K. FISHER.

The 505th regular meeting was held January 11, 1913, with President E. W. Nelson in the chair and 54 persons present. The chairman appointed standing committees on Publications and Communications for the year.

C. V. PIPER exhibited a vase made of wood and covered with a thin veneer of "silk-wood." This veneer is cut from one of the large Polyporus fungi and takes a beautiful polish.

A. S. HITCHCOCK and E. W. NELSON each reported his recent return from a successful collecting trip, the former having collected grasses in Jamaica, Trinidad, and Tobago, while the latter had secured birds and mammals in Arizona.

The regular program consisted of the communications:

The rediscovery of Œnothera grandiflora: S. M. TRACY. The speaker gave an account of two trips made by him to the locality of Bartram's original discovery of this species. (1776). The locality is near Dixie Landing, Alabama, and the flower described by Bartram was found abundant over a limited area. A second visit was made last year in company with Dr. Hugo de Vries.

The problem of the identity of Œnothera Lamarckiana: H. H. BARTLETT. The speaker gave a history of various cultivated strains of plants of this species and its hybrids. He predicted that its original habitat and identity—as yet unknown—would eventually be discovered, probably in America south of the United States and on the Pacific Slope.

Sawflies and their relation to forestry: S. A. ROHWER. These very destructive insects were classed as defoliators and wood borers, and many instances of serious damage by them to growing timber were given. The paper was illustrated by numerous lantern slides showing various species of sawflies—adults, pupae, and larvae—and also illustrations of damaged timber.

The 506th regular meeting was held January 25, 1913, with the President in the chair and 47 persons present.

The following resolution relating to Zoological Nomenclature was presented to the Society with the endorsement of the Council and adopted unanimously:

Whereas certain zoologists have gone on record as favoring (1) A permanent and increasing list of exceptions to the law of priority; (2) A return to the principle of elimination regardless of the generic types that have been designated under the rules, and (3) A rejection of the present unanimous vote rule that has obtained for so many years in the International Congress on Zoological Nomenclature,

Therefore, be it resolved by the Biological Society of Washington that we favor (1) The consistent application of the Law of Priority in all cases; (2) The acceptance of the first designation of a genotype, regardless of the method followed in designating it, and (3) The present unanimous vote rule as making for conservation and stability in nomenclature.

Under the heading Brief Notes, etc., PAUL BARTSCH exhibited a small Ographic camera, with a number of small pictures made with it and enlargements of the same. He spoke briefly of its convenience and adaptability to field uses.

BARTON W. EVERMANN reported that a wireless message had just been received from Agent Lembkey at the Pribilof Islands in which it was stated that the reindeer herds on St. Paul and St. George had increased during the past year from 37 to 65 animals and that all are in excellent condition.

The regular program consisted of two communications:

Notes on the biology of the common termites of the eastern United States: THOMAS E. SNYDER. This paper was illustrated by many lantern slides and was discussed by E. A. Schwarz.

The biting powers of ants: W. L. MCATEE. The speaker's personal observations as well as instances gathered from many sources were cited to show the powers of these small animals. Messrs. E. A. Schwarz, A. C. Weed, A. D. Hopkins and the author of the paper took part in the discussion which followed.

The 507th regular meeting was held February 8, with President Nelson in the chair and 57 persons present.

Prof. BURT G. WILDER gave an illustrated lecture on *The brain as a guide to the affinities of vertebrates*, basing his remarks primarily on the brain of the shark Pentanchus recently described by Smith and Radcliffe as the type of a new family. The speaker showed by means of diagrams the evolution of the selachian brain from the most primitive form found in Chlamydoselachus thru the other Notidani to the typical sharks; and announced his conclusion, from the evidence afforded by the brain, that Pentanchus is not a Notidanid. He did not venture, however, to say just what the systematic position of this shark may be until the vertebrae and intestines have been studied, although it is certainly not related to the Scylliorhinidæ, to which Regan (*Science*, July 19, 1912) assigns it on the theory that the single dorsal fin is an abnormality.

In the discussion which followed, H. M. Smith said that in assigning Pentanchus to the order of ancient sharks, partly on account of the single dorsal fin, he and Mr. Radcliffe had been aware of characters in which this shark differs from typical Diplospondyli, but that no other course seemed expedient at the time the preliminary description was published. The vertebrae, while not diplospondylous but modified cyclospondylous, are of a very primitive type, being only half the size of those in a scylliorhinid shark of the same length, with an extremely small centrum and a very large neural canal.

Theodore Gill discussed the subject at length, and agreed with Prof. Wilder in attaching great taxonomic importance to the brains in sharks and rays. He had concurred in the assignment of Pentanchus to the Notadini, and now regarded it as the type of a peculiar family whose affinities remain to be determined.

D. E. LANTZ, *Recording Secretary.*

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